Boll. Malacologico	**27** (1991)	(1-10)	25-34	Milano 25-6-1991

Evi Vardala - Theodorou*, Paulos Giamas* & Achilles Dimitropoulos*

A SHORT NOTICE ON THE OCCURENCE OF A PAIR OF *THYSANOTEUTHIS RHOMBUS* TROSCHEL, 1857 IN SOUTHERN EUBOIC GULF**

KEY WORDS: *Thysanoteuthis rhombus,* Cephalopoda, Euboic Gulf, Mediterranean

Summary

This paper deal with an occurence of a pair of *Thysanoteuthis rhombus* which were caught in the Southern Euboic Gulf in Greece during the autumn 1989. Although this species has been recorded in Mediterranean waters, it was not possible to locate any reference for Greece. The pair included one female (14 kg) and one male (12 kg) which had a mantle length of 70 cm and 73 cm. respectively. The ovary of the female was full of eggs. The stomachs of both animals were entirely empty.

Riassunto

Il presente lavoro riguarda la rara cattura di una coppia di *Thysanoteuthis rhombus* avvenuta nel settore meridionale del Golfo greco di Eubea nell'autunno 1989. Pur essendo questa specie segnalata per il Mediterraneo, non ci è stato possibile rintracciare alcun riferimento per le acque greche. Il mantello della femmina aveva una lunghezza di 70 cm, quello del maschio di 73 cm, mentre il peso era rispettivamente di 14 kg e di 12 kg. L'ovaia della femmina era piena di uova, mentre lo stomaco risultò completamente vuoto in entrambi.

Introduction

One pair of diamondback squids were caught by Mr. Nikos Moutsis while they were floating about 80 meters off the coast of Karystos, Southern Euboic Gulf (Fig. 1).

The two specimens were floating near the coast and did not escape when pushed ashore, probably because they were exhausted. *Thysanoteuthis rhombus* whose name derives from the Greek words (derivatio nominis) Thysanos (= frange) (fig.m 3,c) and (Teuthis = squid) and (Rhombus = Diamond-shaped) (Fig. 2) is rare in the waters of the Mediterranean Sea.

It is mentioned by CLARKE (1966), TORCHIO (1968), BERDAR and CAVALLARO (1975), MORALES (1981), BIAGI (1982), BELLO (1986) and MANGOLD and BOLETZKY (1987) and others (see CLARKE, 1966 p. 159).

* The Goulandris Natural History Museum, Levidou 13, Kifissia, Greece. Tel. Athens 8015870, 8086405

** Lavoro accettato il 10 ottobre 1990

Results

When the two diamondback squids were donated to the Museum, they had been kept refrigerated for a few weeks. The most obvious diagnostic feature of the two squids was their diamond (rhombic) shape due to the long and broad fins, the bases of which run across the entire length of the mantle (Fig. 2). The other important diagnostic feature are the trabeculae of the arms. These two features were the first clear indications that the animals being studied belonged to *Thysanoteuthis rhombus*. The exact identification was possible following closely the identification keys of FAO catalog for Cephalopods.

The maximum thickness of the female mantle was 31 mm. and of the male 39 mm. The mantle funnel locking apparatus was very strong (Fig. 3, a,b) and -I shaped. The horny beaks were powerful (Fig. 3,e). Their gladius (Fig. 4,c) occupied the entire length of the mantle. Both the mandibles and the gladius are typical of the species. Each arm has two rows of suckers, except the tentacular club that has four rows of suckers. The chitinous sucker rings (Fig. 4,a) reach a maximum value of 5,2 mm. (male A II). On this ring it was possible to count 17 small teeth. On other rings we counted 23 small teeth.

Roper *et al* (1984) mention that *Thysanoteuthis rhombus* is an epipelagic species often occuring in pairs and that maximum mantle length is 100 cm and weight 20 kg. The usual mantle length is about 60 cm. Clearly the two studied specimens had greater dimensions than average. The sexual dimorphism was externally obvious by the occurence of the modified portion (hectocotylus) at the left ventral arm. Once the specimens had been incised, it had been found that their stomachs were entirely empty. The ovary of the female was full of eggs.

In measuring we followed Roper and Voss 1983. Measurements are in mm and most of them are given as an index, a direct proportional relationship to the mantle length or gladius length or total length of hectocotylized arm. The indexes are determined by the formula:

$$\text{Index} = \frac{\text{Character measurement in mm}}{\text{ML (or GL or Length of hectocotylized arm) in mm}} \times 100$$

all that are presented in the table below.

The specimens were prepared with the method described by Roper & Voss (1983). Out of our control was the period from their capture to the arrival at the Museum. 75% ethyl alcohol, and a specially prepared glass tank was used for permanent storage.

	Female specimen	Male specimen
ML (in mm)	697	734
TL (in mm)	1449	1537
VML (in mm)	641	705
MWI	44.9	46.6
HLI	33.7	31.5
HWI	31.5	27.8
FLI	88.2	90.9
FWI	99.8	97.3

	Left	Right	Left	Right
ALI-I	25.8	27.2	21.8	20.4
ALI-II	32.3	33	24.5	28.6
ALI-III	50.2	50.3	44.3	39.5
ALI-IV	31.6	32.3	25.8	30
TtLI	78.9	80.1	77.7	77.8
C1LI	21.5	22.2	17	16.3

GL (in mm)	695	742
GLI	99.7	101.1
GWI	22.9	19.1
RLI	17.5	16.2
RWI	3.0	2.6
EDI	6.6	6.4
LnDI	3.0	2.6
FuLI	16.6	14.6
FFuI	9.2	7.9
HcLI	—	22.8

Max. Diameter of rings in mm

Ring	Female specimen	Male specimen
AI	4.1	5.0
AII	3.5	5.2
AIII	4.1	4.4
AIV	3.0	4.2
Tt	—	5.0

ALI - ARM LENGTH INDEX
EDI - EYE DIAMETER INDEX
FIN - WIDTH INDEX - FWI
FFuI - FREE FUNNEL INDEX
GLI - GLADIUS LENGTH INDEX
HLI - HEAD LENGTH INDEX
HcLI - HECTOCOTYLISED LENGTH INDEX
C1LI - CLUB LENGTH INDEX
FLI - FIN LENGTH INDEX
FuLI - FUNNEL LENGTH INDEX
GL - GLADIUS LENGTH
GWI - GLADIUS WIDTH INDEX
HWI - HEAD WIDTH INDEX
LnDI - LENS DIAMETER INDEX
ML - MANTLE LENGTH
RLI - RACHIS LENGTH INDEX
TtLI - TENTACLE LENGTH INDEX
VML - VENTRAL MANTLE LENGTH
MWI - MANTLE WIDTH INDEX
RWI - RACHIS WIDTH INDEX
TL - TOTAL LENGTH

FIGURES

Fig. 1 - *Map of the Euboic Gulf area. The square shows the locality where the pair of the diamond squids was caught.*

Fig. 2 - *Dorsal view of the Thysanoteuthis rhombus*
(Redrawn from FAO 1984)

Fig. 3a *Funnel locking cartilage*
(Scale in cm)

Fig. 3b *Mantle locking cartilage*
(Scale in cm)

Fig. 3c *The thysanus*

Fig. 3d *Buccal apparatus/Radula*
(Scale in mm)

Fig. 3e *The horny beaks*
(Scale in cm)

Fig. 4a *Chitinous sucker rings.*
(Diameter about 4-5 mm)

Fig. 4b *The lens of the eye.*
(Dimensions in text)

Fig. 4c *The gladius.*
(Dimensions in text)

Photos: E. Vardala Theodorou
Drawings: A. Dimitropoulos

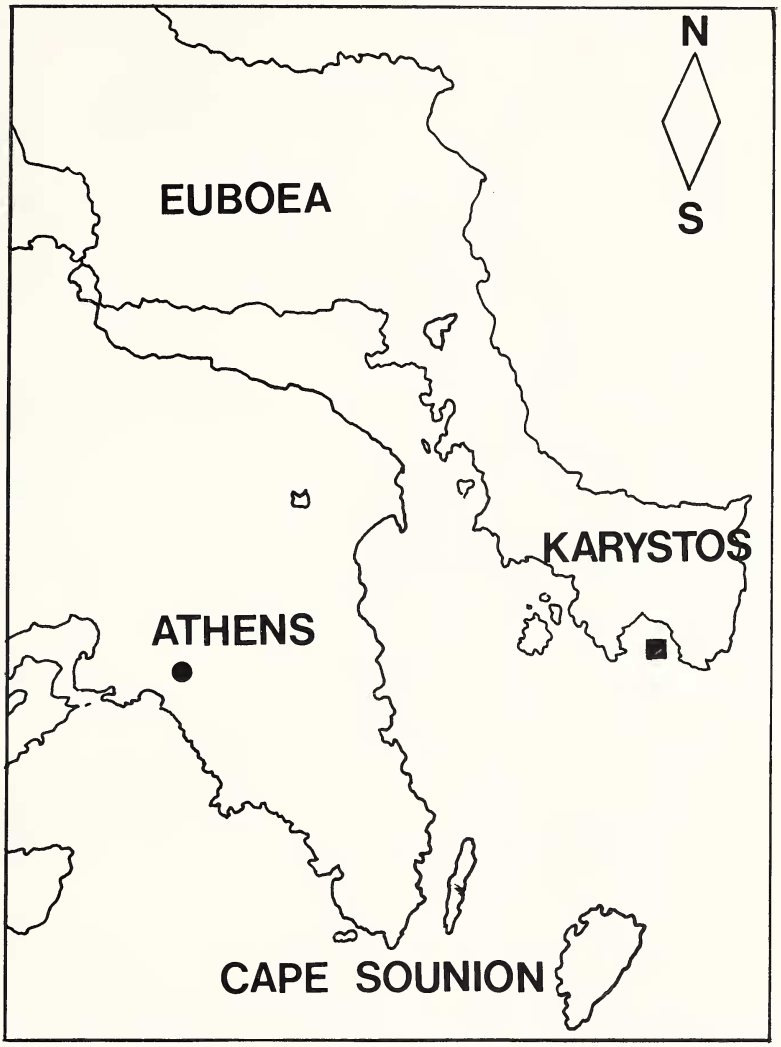

Fig. 1

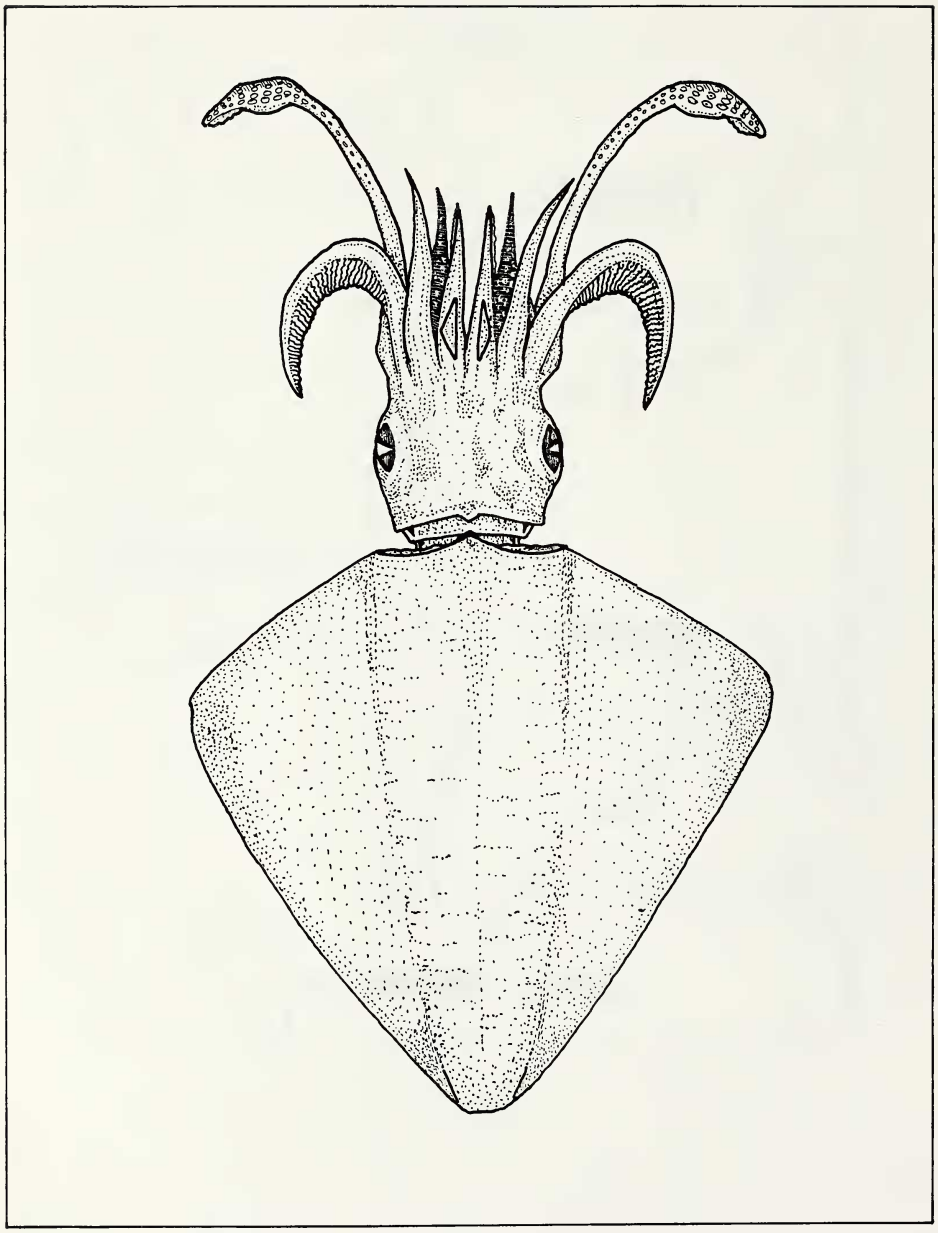

Fig. 2

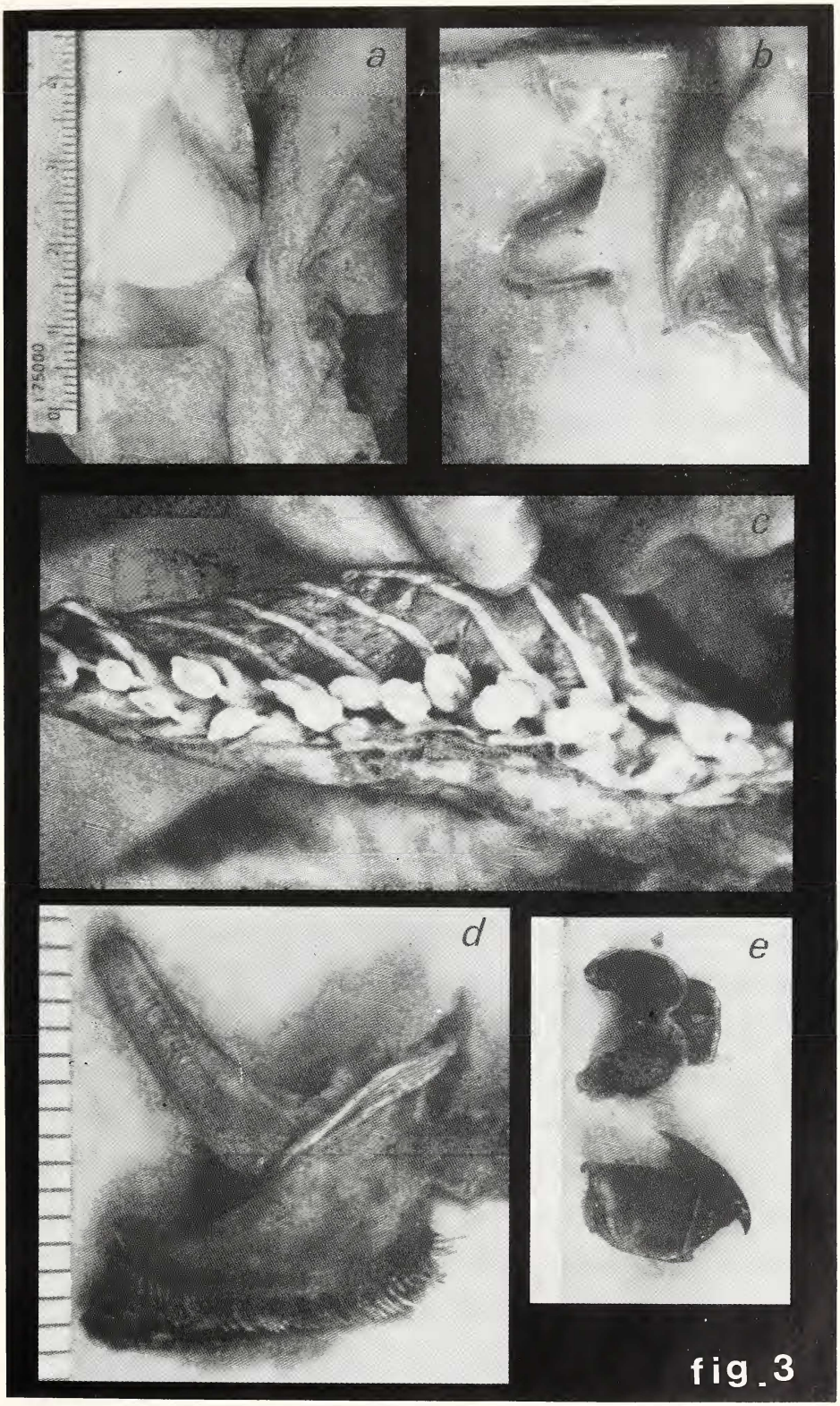

fig. 3

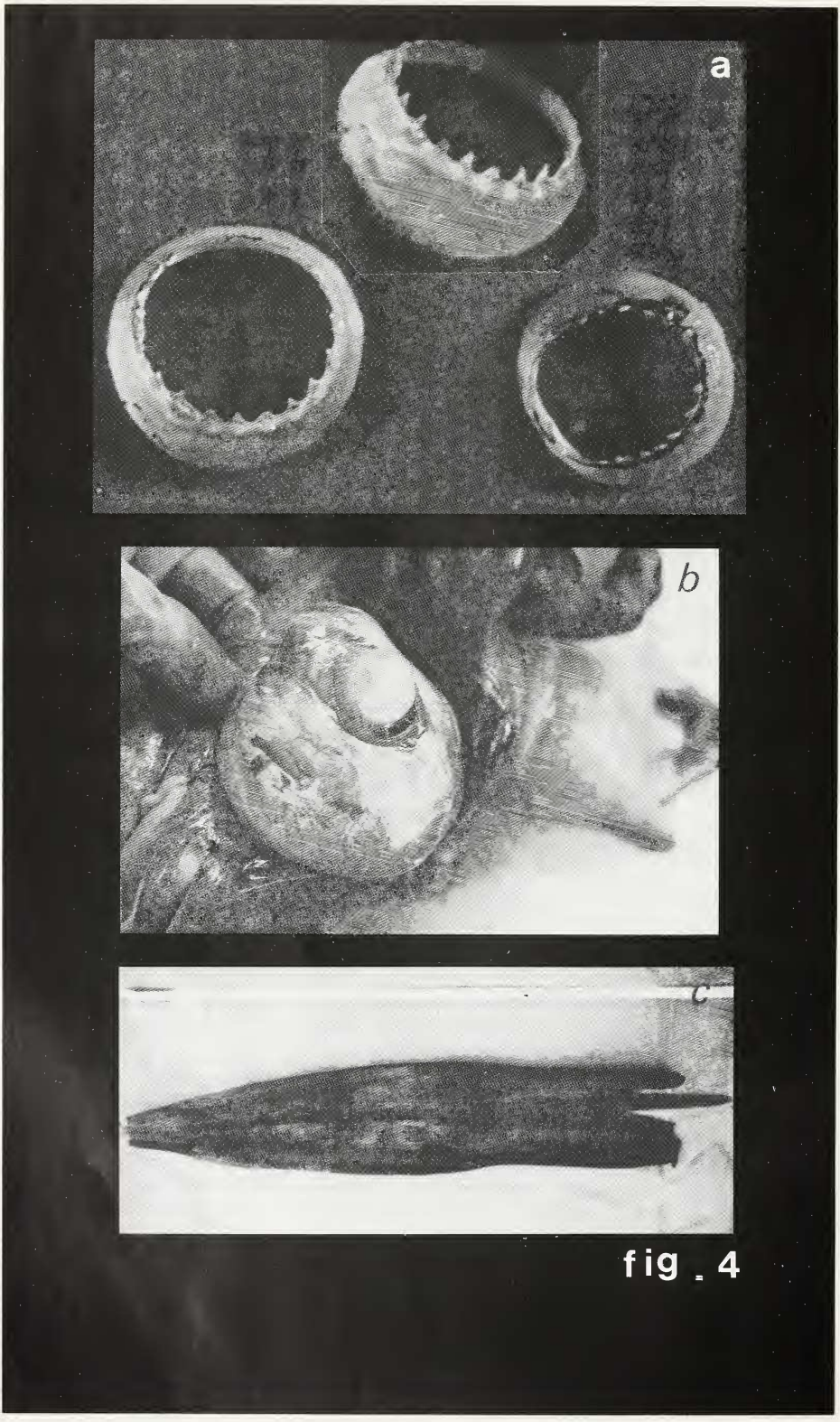

fig. 4

Discussion

The occurence of this species in the Southern Euboic Gulf is very interesting. Although the species is epipelagic, the presence of a pair in greek waters is not unexpected, since it comes to complete the distribution records, mainly from the western Mediterranean. We know several traits of the behaviour of epipelagic cephalopods from Japanese waters (Roeleveld & Pheifer, 1987), where the animals become stranded regularly, possibly exhausted after rough weather. It is also mentioned that diamondback squids are more often caught in pairs rather than single specimens, but it is not known whether each pair consists of a male and a female. In addition to the above information, the specimens which have been found in the Southern Euboic Gulf were exhausted, a fact that is furthermore verified by their totally empty stomachs, probably because of egg laying, a condition worsened by rough weather. Another interesting point, the presence of a true pair, male and female, comes to add to our up to date records.

Acknowledgements

We would like to express our sincere thanks to the following persons: Mr. N. Moutsis; without his donation, this paper could never come to publicity. Mr. and Mrs. Goulandris for their interest and precious help. S.v. Boletzky, P. Kaspiris, V. Kiortsis, I. Legakis, K. Stergiou and N. Symeonidis for their valuable information and help, Mr. D. Apalodimos, Miss. K. Prapopoulou and K. Hingley for correcting the english text.

REFERENCES

Adams W., (1973) - Cephalopoda from the Red Sea. *Contributions to the knowledge of the Red Sea*, Haifa, **47**: 9-47.

Bello G., (1986) - Catalogo dei Molluschi Cefalopodi viventi nel Mediterraneo, *Bollettino Malacologico* Milano, **22** (9-12): 197-214.

Berdar A. & G. Cavallaro (1975) - Cephalopoda washed along the beaches of the Sicilian coast of the straits of Messina. *Mem. Biol. Mar. Ocean.*, Messina, **5**(5): 121-138.

Biagi V., (1982) - Sul rinvenimento di un giovane esemplare di *Thysanoteuthis rhombus* Troschel (Cephalopoda - Teuthoidea) in acque elbane. *Bollettino Malacologico* Milano, **18** (7-8): 137-144.

Buchsbaum, R., L.J. Milne (1963) - Das Tierbuch in Farben. Niedere Tiere. Deutsche Buch Gemeinschaft. Berlin, Darmstadt, Wien 360 p.

Clarke, M.R., (1966) - A Review of the Systematics and Ecology of Oceanic Squids. *Adv. Mar. Biology*, **4**: 91-300.

Kaspiris, P., and P. Tsambaos (1986) - A preliminary list of Cephalopoda from Western Greece. *Biologia Gallo-hellenica*, Vol. 12 pp. 209. *3e Congr. International sur la Zoog et l'Ecologie de la Grèce et des Regions Avoisinantes*. Patras April 1984.

Mangold, K., & S.v. Boletzky (1987) - Cephalopodes. IN: FAO Méditerranée et Mer Noire. Zone de peche 37. Revision 1. Volume I. Vegetaux et Invertebrés. pp. 699-700, Rome.

Morales, E., (1981) - Presencia de *Thysanoteuthis rhombus* Troschel, en el puerto de Mahon (Menorca). *Inv. Pesq.* Barcelona, **45** (1): 17-20.

Roeleverd, M. & F. Pheifer (1987) - The Diamond Squid: a large squid that regularly attracts the attention when stranded on South African beaches. *Sagittarius* Cape Town, **2** (4): 21-22.

Roper C.F.E. and M.J. Sweeney (1983) - Techniques for fixation, preservation and curation of Cephalopods. *Memoirs of the National Museum Victoria*, Victoria, **44**: 28-47.

Roper, C.F.E. and G.L. Voss (1983) - Guidelines for taxonomic descriptions of Cephalopod species, *Memoirs of the National Museum Victoria*, Victoria, **44**: 49-63.

Roper, C.F.E, M.J. Sweeney & C.E. Nauen (1984). - FAO species catalogue. Cephalopods of the world. An annotated and illustrated catalogue of species interest to fisheries. *FAO Fish. Synop*, Rome; 125, (3): 277.

Stergiou, K.I. (1987) - Cephalopod abundance in Greek waters in relation to environmental variations. *3rd Congr. International Sur la Zoog et Ecol. de la Grece et des Regions Avoisinantes*. Kammena Vourla, Avril 1987. *Biolog. Gallo-Hellenica*. Athens, **13**: 25-34.

Torchio, M., (1968) - Elenco dei Cefalopodi del Mediterraneo con considerazioni biogeografiche ed ecologiche. *Ann. Mus. Civ. St. Nat. Genova* Genova, **77**: 257-269.